Space Weather Technical Forecast

Issued on Wednesday, 03 August 2022 at 01:24 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: No significant activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours with two C-class flares originating from a region off the west limb, the largest a C4.2 at 02/1533 UTC. There are currently two sunspot regions on the visible disc. AR3068 Esi/Beta-gamma-delta in the south centre disc has shown minor growth with more intermediate spots developing and a delta configuration within the penumbra just east of the leader, but remains stable with no flares of note. The other region is an as yet unnumbered unipolar spot that has rotated onto the southeast disc. No Earth-directed CMEs were observed.
Solar Wind / Geomagnetic Activity: Earth has likely been grazing the High Speed Stream from coronal hole 07, with solar wind speeds, as measured at L1, fluctuating between 460 and 530 km/s. Density was around average, but rose above average at around 02/0500 UTC, before easing back later in the period. The total interplanetary magnetic field (IMF), Bt was generally weak, at below 8 nT. The north-south component, Bz, fluctuated weakly between +7/-7 nT. The Phi angle was negative (towards the Sun). Geomagnetic activity was Quiet (Kp 1-2).
Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV), as measured by GOES-16 was at background levels. The high energy electron flux (greater than 2 MeV) was at background. Electron fluence showed an erratic rising trend, but remained well below the Active threshold (1e8 integrated flux), with an observed fluence value of 6.5e6 integrated pfu recorded at 02/2359 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low solar activity is expected to continue, with a slight chance of M-class flares. Flare risks possibly increasing due to active regions rotating onto the visible disc during the period.
Solar Wind / Geomagnetic Activity: No CMEs have been assessed as Earth-directed. Solar winds are slightly-elevated due to Earth being in the High Speed Stream of CH07/-. These winds are expected to persist until day 2 or 3 (4th-5th) with background speeds following as Earth exits into the ambient wind. Geomagnetic activity should remain mainly Quiet with a chance of Unsettled or Active intervals through the period, perhaps increasing to mainly Unsettled with a slight chance of G1 minor geomagnetic storms on day 4 with the next HSS.
Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is expected to remain at background levels. The high energy electron flux (greater than 2 MeV) is expected to remain mostly at background to moderate levels, but with a chance of rising to give high levels at the diurnal maxima. The corresponding 24 hour fluence is most expected to remain below the Active threshold (1e8 integrated pfu) but on a steadily increasing trend.

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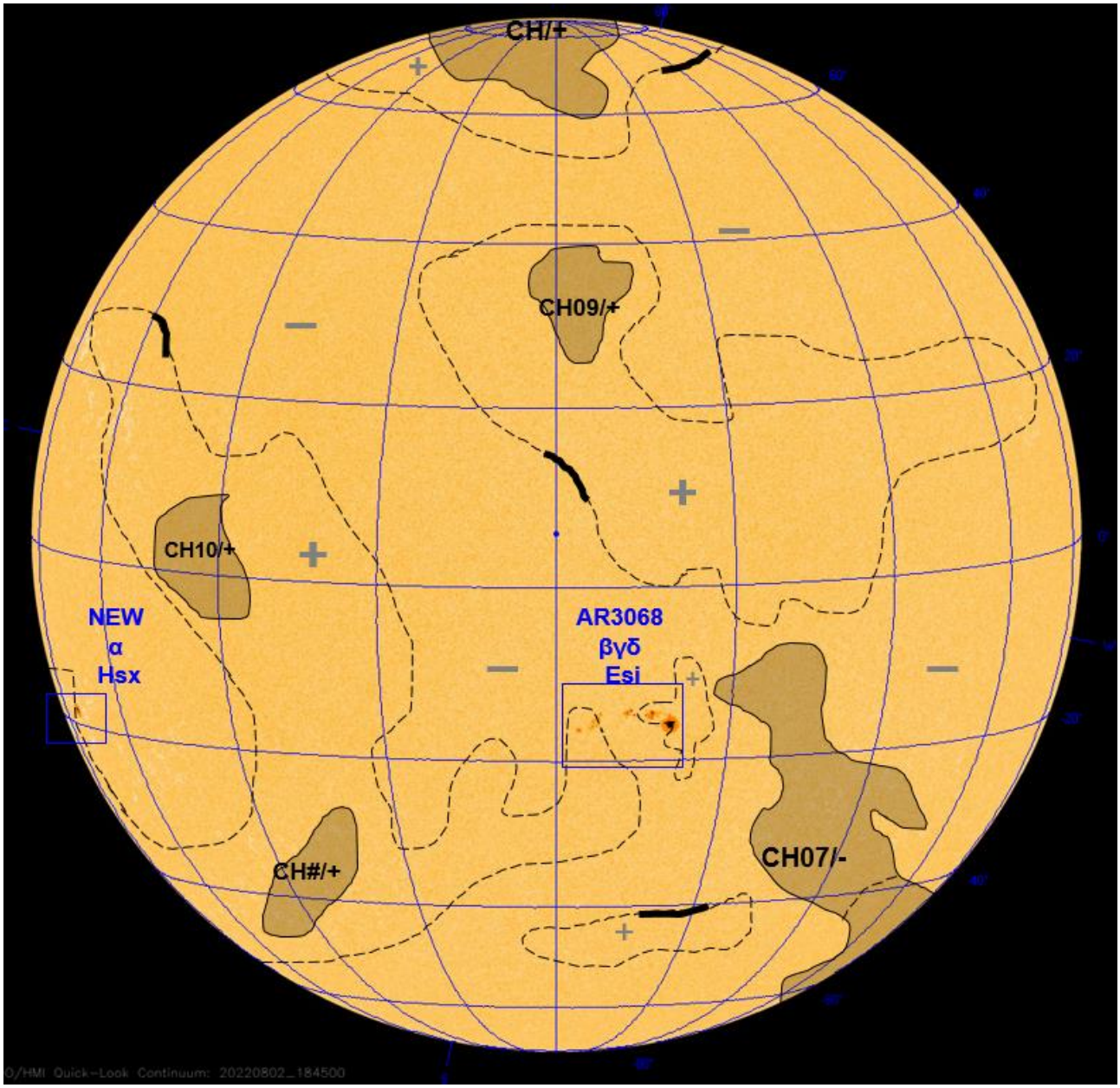
Figure 1. Solar Analysis Valid 02/1900UTC.



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Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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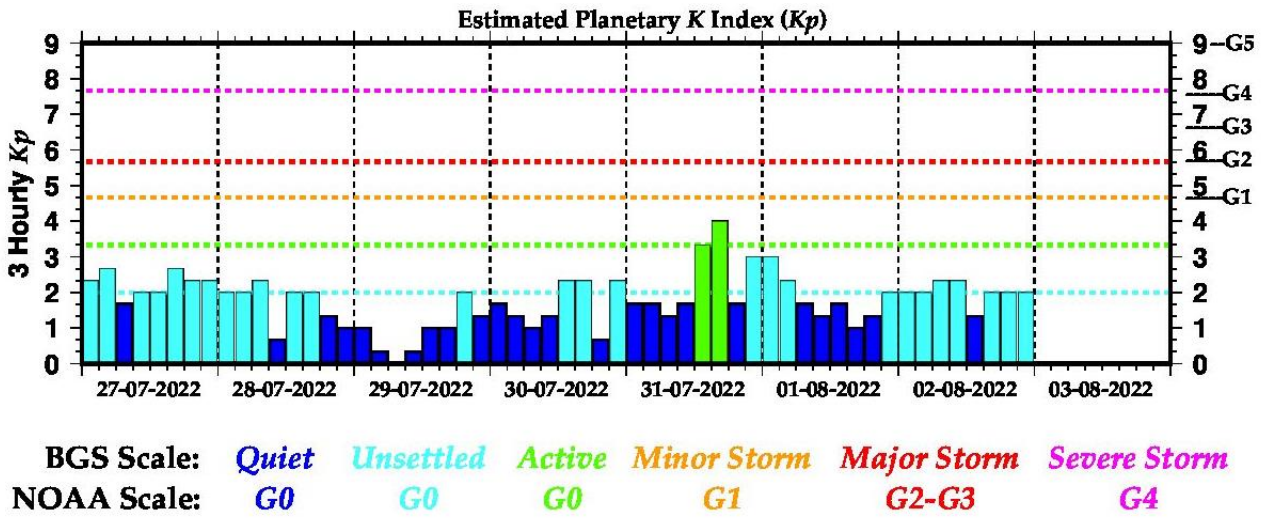
Geomagnetic Storms:

No Earth directed CMEs are currently expected.
Earth is currently embedded within the High Speed Stream of CH07/- giving elevated solar winds. This is a large northward extension of the southern polar crown, spanning nearly 50 degrees of longitude along the southern hemisphere. Solar winds are expected to remain elevated or slightly elevated whilst within this high speed stream (HSS), which is currently expected to persist through to day 2 or 3 (4th-5th). The next HSS arrival is expected on day 4 (6th) from CH09/+.
Geomagnetic activity should remain mainly Quiet with a chance of Unsettled or Active intervals through the period, perhaps increasing to mainly Unsettled with a slight chance of G1 minor geomagnetic storms on day 4 with the next HSS.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	1	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections- Nil

Figure 2: BGS estimated Kp



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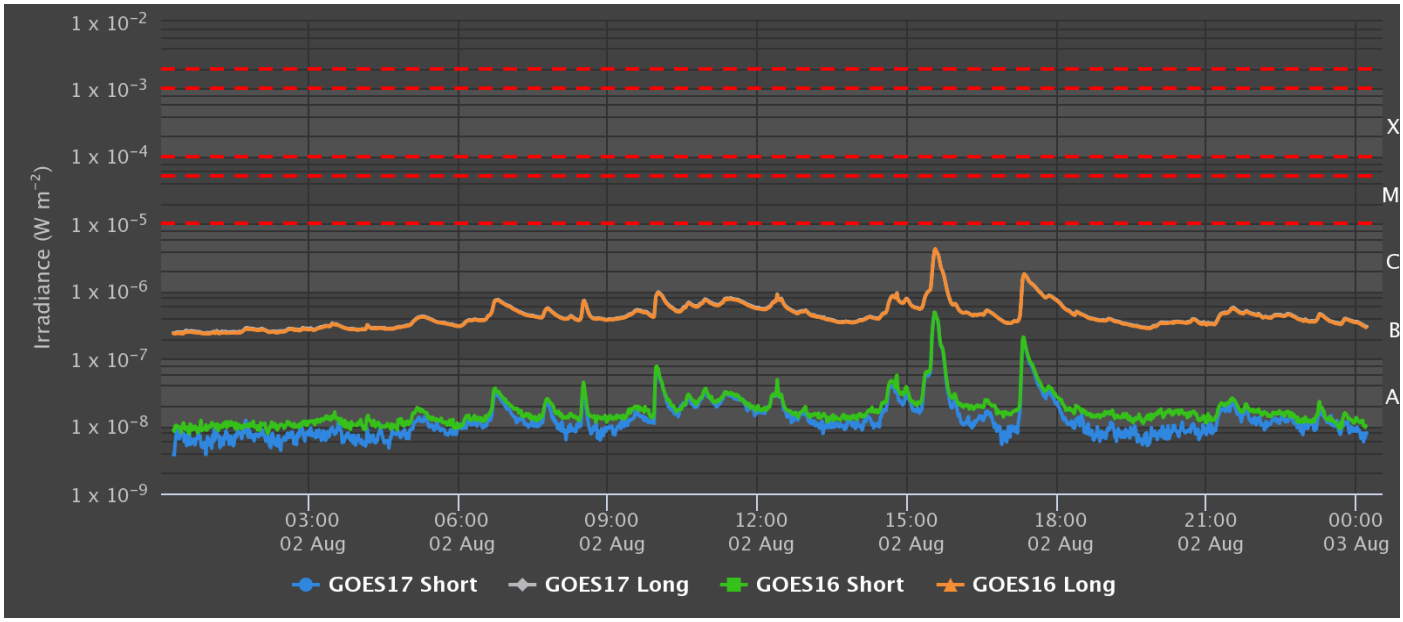
Radio Blackouts - X-Ray Flares:
Solar Activity is currently Low, with only two sunspot regions on the visible disc. The most prominent is in the central southern disc, AR3068 Esi/Beta-gamma-delta. This has seen some growth within the penumbra just east its leader spot, developing a delta configuration, with a reverse polarity region emerging and a subsequent increase in magnetic complexity. Despite this, it remains a relatively small region in terms of area, with only a slight chance of producing an M-flare. The other region is an as yet unnumbered Hsx/alpha spot that has recently rotated over the southeast disc. This region has the potential to reveal further complexity as it moves into a clearer view, but current indications are that significant flaring from this region is unlikely. Activity is likely to remain Low, with a slight chance of Moderate activity due to any M-flares that may occur, primarily from AR3068.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 3: GOES16 X-Ray flares



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Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) is currently at Background levels and is expected to remain at this level through the period. AR3068 will need monitoring for any further development, however, with the potential to increase radiation storm risks as it transits across the eastern hemisphere of the solar disc.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) as measured by GOES-16 is initially expected to remain mostly at background levels, but a chance of rising to Moderate and approaching High (1000 pfu) at diurnal peak. This will most likely occur as solar winds ease later in the period allowing any recent enhanced electron population in the Van Allen Belt to relax back to GEO.

The associated 24 hour fluence, however, is expected to remain below the Active threshold (1e8 integrated pfu) throughout. While an increasing trend is likely, electron flux levels are currently not expected to persist at High for a sufficiently long period of time to result in fluence reaching Active levels. This is supported by REFM which is currently giving good guidance.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	No	1	5	10	10
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

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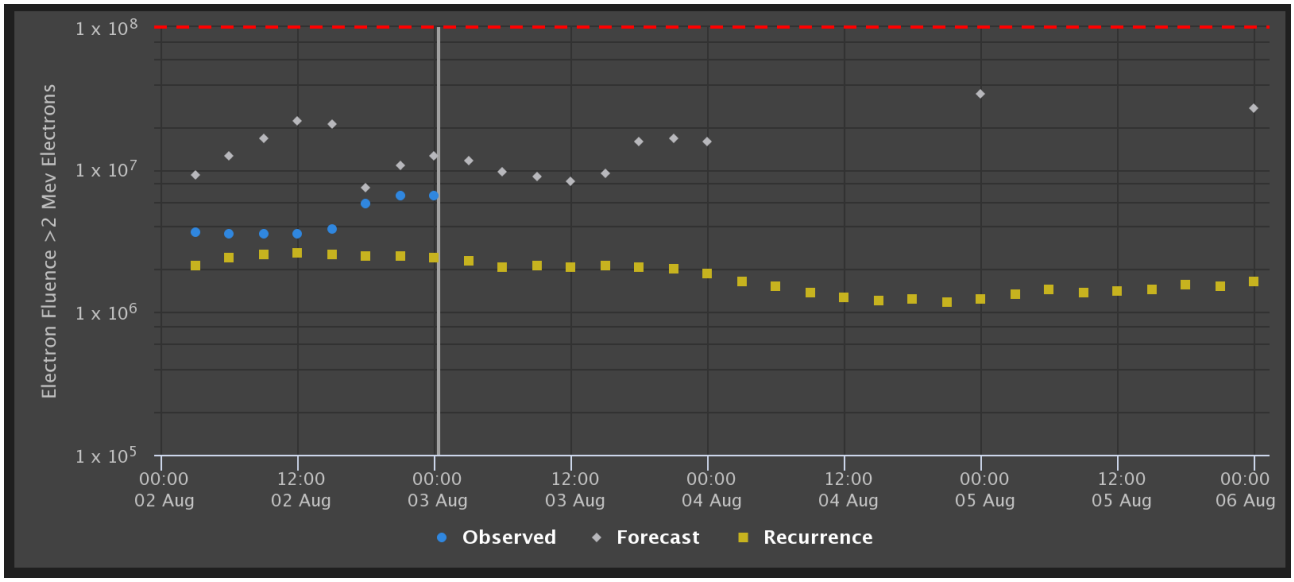
Figure 4: MOSWOC REF Model



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